



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,267	10/17/2003	Anthony P. Reeves	955-41	3785
23869 7590 05/29/2008 HOFFMANN & BARON, LLP 6900 JERICHO TURNPIKE SYOSSET, NY 11791				
EXAMINER				
WOLDEMARIAM, AKILILU K				
ART UNIT		PAPER NUMBER		
2624				
MAIL DATE		DELIVERY MODE		
05/29/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/688,267

Applicant(s)

REEVES ET AL.

Examiner

AKLILU k. WOLDEMARIAM

Art Unit

2624

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-99 is/are pending in the application.
- 4a) Of the above claim(s) 2-9, 11-18, 20-27, 29-51, 53-75, 77-99, is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 10, 19, 28, 52 and 76 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsman's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 11/17/2003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to election with traverse

1. Applicants elected the species of figs 31-38 with traverse grounds of those figs 31-38 are directed in the specification as used together and are not mutually exclusive Examiner agrees that the species figs 31-38 is one species, however applicant does not provide any arguments about the other different species. Finally, there is no dependent claims directed to the elected species only generic claims 1, 10, 19, 28, 52 and 76 are the claims read on the species of figs 31-38.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on November 17, 2003 was filed after the mailing date of November 17, 2003. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. *Claims 1, 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kostis, (Three-Dimensional Segmentation and Growth-Rate Estimation of Small Pulmonary Nodules in Helical CT images, Vol.22, N0.22, October 2003) in view of*

Carreira, (Computer-aided diagnoses: Automatic detection of lung nodules, Vol.25, No. 10, October 1998).

Regarding claims 1, 10 and 19, *Kostis discloses* a method, an apparatus and an article of manufacture for analyzing a computed tomography scan of a whole lung for lung nodules (*see page 1259, column 1-column 2, computer vision methods for the analysis of pulmonary nodules in CT scans have, until recently, relied on two-dimensional measurements of the single image considered to best represent the lesion, One of the issues has been the anisotropic nature of tomographic images, especially those produced in full-lung scans in which nodules are detected*), the method comprising the steps of:

(a) segmenting a first lung region and a second lung region from the computed tomography scan, the first lung region corresponding to lung parenchyma of the lung and the second lung region corresponding to at least one of a pleural surface of the lung and a surface defined by vessels within the lung (*see page 1263, column 1-column 2, segmentation (nodule region, surrounding lung parenchyma, pleural surface and thoracic wall region)*);

Kostis does not disclose (b) generating an initial list of nodule candidates from the computed tomography scan within the first lung region, the list including at least a center location and an estimated size associated with each nodule candidate;

- (c) generating a subimage for each nodule candidate in the initial list;
- (d) selectively removing streaking artifacts from the subimage; and

(e) filtering the nodule candidate identified on the initial list to eliminate false positives from the list.

However, Carreira discloses (b) generating an initial list of nodule candidates from the computed tomography scan within the first lung region, the list including at least a center location and an estimated size associated with each nodule candidate (see page 1999, column 2 and page 2001, column 1, for each threshold level, we calculate the circularity and size of each nodule region and analyze its variation, process we call a growth test and for estimation of the coefficients of the bicubic function $f(r,c)$ that models the surface in the neighborhood of each pixel, we consider a window with $w=21$. Figure 4(b) displays the three dimensional representation of the function $f(r, c)$ that approximates the gray levels of the image that contain the simulated nodule);

(c) generating a subimage for each nodule candidate in the initial list (see page 2003, column 1-2, subimage referred to subregion);

(d) selectively removing streaking artifacts from the subimage (see page 1999, column 1-2, removing streaking artifacts referred to Gaussian filter); and

(e) filtering the nodule candidate identified on the initial list to eliminate false positives from the list (see page 2003, column 1-2, for example this confidence factor eliminated most of the false positive areas when the images of the training set were reanalyzed).

It would have been obvious to the ordinary skill in the art at the time when the invention was made to use Carreira's generating an initial list of nodule candidates from

the computed tomography scan within the first lung region, the list including at least a center location and an estimated size associated with each nodule candidate in Kostis's a method for analyzing a computed tomography scan of a whole lung for lung nodules because it will allow to improve of the performance parameters, considering the global process shown in Table V, (Carreira, see page 2006, column 1).

6. *Claims 28, 52 and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kostis as applied to above in view of Ishida et al., Ishida (U.S. Patent number 6, 067, 373).*

Regarding claims 28, 52 and 76 , *Kostis discloses* a method, a registration apparatus and an article of manufacture for correlating a segmentation of 3-d images of a pulmonary nodule from a high-resolution computed tomography (CT) scans, the images being in a floating point pixel-format associated with a 6-dimensional parameter space and including a first image (im_1) obtained at time-1 and a second image (im_2) obtained at time-2 (see page 1299, column 2, one of the predictions of nodule malignancy is growth rate. Similarly, nodule size is also highly correlated with malignancy and page 1260, column 1, we describe 3-D methods for volumetric doubling-time estimation in small pulmonary nodules seen in high-resolution CT images), the method comprising the steps of:

(a) selecting a first region-of-interest (ROI_1) for the nodule in the first image (im_1) (see page 1263, column 1-2, the following four regions, nodule region, surrounding lung parenchyma, pleural surface and thoracic wall region);

(b) selecting a second region-of-interest (ROI_2) for the nodule in the second image (im_2) (see page 1263, column 1-2, *the following four regions, nodule region, surrounding lung parenchyma, pleural surface and thoracic wall region*);

(e) adjusting the first segmented nodule (S_1) (see page 1263, column 1-2, *surrounding lung parenchyma*) and the second segmented nodule (S_2) (see page 1263, column 1-2, *pleural surface*).

Kostis does not disclose (c) registering the second region-of-interest (ROI_2) to the first region-of-interest (ROI_1) to obtain a transformed second region-of-interest (ROI_{2t});

(d) separately segmenting both the nodule in the first region-of-interest (ROI_1) and the transformed second region-of-interest (ROI_{2t});

Ishida discloses (c) registering the second region-of-interest (ROI_2) to the first region-of-interest (ROI_1) to obtain a transformed second region-of-interest (ROI_{2t}) (see column 2, lines 21- 50, *temporally sequential images and additional iterations of image warping are possible to enhance image registration between the first digital image and the warped version of the second digital image, followed by image subtraction of the first digital image and the final warped image to produce a difference image from which diagnosis of temporal changes ensues*);

(d) separately segmenting both the nodule in the first region-of-interest (ROI_1) and the transformed second region-of-interest (ROI_{2t}) (see column 2, lines 21- 50, *temporally sequential images and additional iterations of image warping are possible to enhance image registration between the first digital image and the warped version of the second digital image, followed by image subtraction of the first digital image and the*

final warped image to produce a difference image from which diagnosis of temporal changes ensues) and a machine readable medium containing one or more programs (see column 13, lines 32-52, the present invention includes a computer program product which is a storage medium including instructions which can be used to program a computer to perform a process of the invention).

It would have been obvious to the ordinary skill in the art at the time when the invention was made to use Ishida's registering the second region-of-interest (ROI_2) to the first region-of-interest (ROI_1) to obtain a transformed second region-of-interest (ROI_{2t}) in Kostis's a method for correlating a segmentation of 3-d images of a pulmonary nodule from a high-resolution computed tomography (CT) scans, the images being in a floating point pixel-format associated with a 6-dimensional parameter space and including a first image (im_1) obtained at time-1 and a second image (im_2) obtained at time-2 because it will allow to provide a novel image processing technique to overcome severe misregistration errors mainly due to differences in a subject's inclination and/or rotation in temporally sequential images, [Ishida, see column 2, lines 21-24].

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to AKLILU k. WOLDEMARIAM whose telephone number is (571)270-3247. The examiner can normally be reached on Monday-Thursday 6:30 a.m.-5:00 p.m EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Samir Ahmed,
Examiner
Art Unit 2624

/A. k. W./
Examiner, Art Unit 2624
05/13/2008

/Samir A. Ahmed/
Supervisory Patent Examiner, Art Unit 2624